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Research article

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Jambu, a new genus of tarantula from Brazil (Araneae, Theraphosidae, Theraphosinae)

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Abstract. The genus *Jambu* gen. nov. is proposed based on two new species: *Jambu paru* gen. et sp. nov. and *Jambu manoa* gen. et sp. nov. *Hapalopus butantan* is transferred to *Jambu*; consequently, *Jambu butantan* gen. et comb. nov. is proposed. The geographic distribution of *J. butantan* is extended on the basis of new material collected. The new genus and the new species are here diagnosed, described and illustrated. The shape of the genitalia of *Jambu* resembles that of Hapalopini but differs from most of them by the presence of type IV urticating setae. The presence of this type of urticating setae allows us to hypothesize that this new genus is phylogenetically related with Grammostolini. Males of *Jambu* differ from those of other genera of Grammostolini by the presence of a paraembolic apophysis on the palpal bulb. Females also differ from those of other Grammostolini by the spermathecae morphology, with one medial lamp-shaped or heart-shaped receptacle. The homology of some features and the taxonomic placement of the new genus are discussed.

Keywords. Tarantula, Neotropics, Theraphosinae.

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Introduction

Theraphosidae Thorell, 1869 is the most speciose family of mygalomorph spiders comprising more than 1000 species and 162 genera (World Spider Catalog 2023), including the largest tarantulas of the world. More than half of the described species are placed in the subfamily Theraphosinae Thorell, 1869, endemic to the Neotropics, which groups three tribes, differentiated especially by the type of urticating setae (Turner *et al.* 2018): Theraphosini Turner *et al.*, 1918, Hapalopini Turner *et al.*, 1918, and Grammostolini

Turner *et al.*, 1918. The latter is mainly characterized by the presence of type IV urticating setae (Turner *et al.* 2018). The homogeneous morphology of the tarantulas constitutes a taxonomic difficulty for the classification which has been considered as chaotic (Pérez-Miles *et al.* 1996; Bertani 2000). However, recent research contributed to the discovery of new taxa and new records (Gabriel 2014, 2016; Mendoza *et al.* 2016; Perafán *et al.* 2016; Fukushima & Bertani 2017; Longhorn & Gabriel 2019; Gabriel & Sherwood 2019, 2020a, 2020b; Sherwood & Gabriel 2019, 2022; Mori & Bertani 2020; Bertani & Almeida 2021; Ferretti 2021; Kaderka *et al.* 2021; Ferretti *et al.* 2023). Also, the incorporation of molecular systematics significantly increased the contributions to their origin, phylogeny and biogeography (Turner *et al.* 2018; Lüddecke *et al.* 2018; Foley *et al.* 2019, 2021; Biswas *et al.* 2023).

During the study of theraphosid spiders from Amazonian Brazil deposited in two biological collections, the Museu Paraense Emílio Goeldi (Belém, Pará) and the Instituto Nacional de Pesquisas da Amazônia (Manaus, Amazonas), we found two species sharing the presence of type IV urticating setae, but differing remarkably from all known genera of Grammostolini. The copulatory bulb of the males has a paraembolic apophysis, only known from the Hapalopini genus *Cyriocosmus* Simon, 1903 and some species of *Hapalopus* Ausserer, 1875; in these novel species, the paraembolic apophysis is broader, spatulate, and serrated. Females have spermathecae with one medial lamp-shaped or heart-shaped receptacle, also different from those of all known Grammostolini. Based on this evidence we propose *Jambu* gen. nov.

All known species of *Hapalopus* have type III urticating setae with the exception of *Hapalopus butantan* (Pérez-Miles, 1998), which presents type IV urticating setae and a paraembolic apophysis, so we propose its transfer to the new genus as *Jambu butantan* gen. et comb. nov. Thus, *Jambu* gen. nov. is composed of three species distributed in Brazil: *Jambu paru* gen. et sp. nov., *Jambu manoa* gen. et sp. nov. and *Jambu butantan*, their morphological singularities and hypothetical homologies are discussed.

Material and methods

Measurements were taken under a stereo microscope with an ocular micrometer and are in millimeters. Total length does not include chelicerae, nor spinnerets. Palpal bulb terminology follows Bertani (2000), Fukushima *et al.* (2005) and Fonseca-Ferreira *et al.* (2017). Spination description follows Pérez-Miles *et al.* (2008); leg scopula is described as proposed by Pérez-Miles (1994); tibial apophysis are described following Perafán & Pérez-Miles (2014); and urticating setae following Cooke *et al.* (1972) and Bertani & Guadanucci (2013). When bilateral features are counted (e.g., cuspules, spines) left/right numbers are represented.

Abbreviations

ALE	=	anterior lateral eyes
AME	=	anterior median eyes
OQ	=	ocular quadrangle (incl. lateral eyes)
p	=	prolateral
PA	=	paraembolic apophysis
PI	=	prolateral inferior keel
PLE	=	posterior lateral eyes
PME	=	posterior median eyes
PS	=	prolateral superior keel
r	=	retrolateral
TA	=	tegular apophysis
v	=	ventral

Repositories

- CZUFMT-ARA = Zoological Collection (Arachnology), Universidade Federal de Mato Grosso, Mato Grosso, Brazil
FCE-My = Facultad de Ciencias (Arachnological collection), Montevideo, Uruguay
IB = Instituto Butantan, São Paulo, Brazil
INPA = Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil
MEKRB-UA = Museo de Entomología Klaus Raven Büller at Universidad Nacional Agraria La Molina, Lima, Perú
MPEG = Museu Paraense Emílio Goeldi, Belém, Pará, Brazil
MUSM-ENT = Museo de la Universidad de San Marcos (Entomological Collection), Lima, Perú

Results

Class Arachnida Cuvier, 1812
Orden Araneae Clerk, 1757
Family Theraphosidae Thorell, 1869
Subfamily Theraphosinae Thorell, 1869

Genus *Jambu* gen. nov.

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Figs 1–10

Type species

Jambu paru gen. et sp. nov. by present designation.

Diagnosis

Males of *Jambu* gen. nov. differs from those of all known Theraphosidae by the combined presence of type IV urticating setae and a spatulated, wide, paraembolic apophysis on the palpal bulb. Also, males of *Jambu* have a pronounced tegular apophysis on palpal bulb. The male tibial apophysis is very sclerotized, composed of two convergent branches, the larger with a short and strong apical spine. Females differ from those of other Theraphosidae by the combination of type IV urticating setae and spermathecae morphology with single lamp-shaped or heart-shaped receptacle. Both sexes have dorsal abdominal patterns of dark brown spots on a lighter brown background.

Etymology

The genus is named after the word ‘Jambu’ which refers to a native plant from Brazilian Amazonia used as an ingredient in traditional gastronomy as Tacacá soup and as a natural analgesic. The gender is neuter.

Composition

Jambu paru gen. et sp. nov., *Jambu manoa* gen. et sp. nov., *Jambu butantan* (Pérez-Miles, 1998) gen. et comb. nov.

Distribution

Northern Brazil, Amazon Basin.

Jambu paru gen. et sp. nov.

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Figs 1–5, 10; Tables 1–2

Diagnosis

Males resemble those of *J. manoa* gen. et sp. nov. and *J. butantan* gen. et comb. nov. by the presence of a long filiform embolus but differ from them in the presence of a very developed subtriangular PI together with a serrated PA (Figs 3, 4A–B) and the presence of a retrolateral process on the palpal tibia (Fig. 1E). Additionally differs from *J. butantan* in the absence of PS on palpal bulb (Figs 3, 4A–B). Females differ by the presence of an abdominal pattern with two anterior transverse narrow lines and a posterior brown subtriangular spot (Fig. 2C) and by the presence of a single lamp-shaped spermathecal receptacle (Fig. 4E).

Etymology

The specific epithet is a noun in apposition which refers to an isolated indigenous land Rio Paru d’Este, which is in the area of collection, Almeirim, State of Pará, Brazil.

Type material

Holotype

BRAZIL • ♂; Pará, Almeirim, Jari; 1°11'28" S, 52°38'52" W; 28 Feb. 2005; T. Gardner and E. Ribeiro-Júnior leg.; MPEG 7437.

Paratypes

BRAZIL • 1 ♀; same locality, date and collectors as for holotype; 0°35'28" S, 52°44'09" W; MPEG 7447 • 1 ♂; Pará, Almeirim, Jari, Área 56; 00°42'42" S, 52°40'08" W; 11 Feb. 2005; T. Gardner leg.; CZUFMT-ARA 1303 • 1 ♂; Quaruba; 01°1'32" S, 52°54'17" W; 27 Mar. 2005; T. Gardner and M.A. Ribeiro-Júnior leg.; MUSM-ENT 0511103 • 2 ♂♂; same collection data as for preceding; MPEG 7446, MPEG 7441 • 1 ♂; Bituba; 01°11'28" S, 52°38'51" W; 28 Feb. 2005; T. Gardner and M.A. Ribeiro-Júnior leg.; MEKRB-UA 971/2005 • 2 ♂♂; same collection data as for preceding; MPEG 7448, MPEG 7450 • 2 ♂♂; same locality as for preceding; 7 Mar. 2005; T. Gardner leg.; MPEG 7442 • 1 ♂; same collection data as for preceding; FCE-MY 1466 • 2 ♂♂; same collection data as for preceding; MPEG 7444 • 1 ♀ (examined by scanning electronic microscope); Pará, Almeirim; 01°1'32" S, 52°54'17" W; 3 Apr. 2005; T. Gardner and M.A. Ribeiro-Júnior leg.; MPEG 7440.

Description

Male (holotype MPEG 7437)

Total length 24, carapace length 11.50, width 11.13. Anterior eye row procurved, posterior recurved. Eye sizes and interdistances: AME 0.32, ALE 0.56, PME 0.28, PLE 0.42, AME–AME 0.26, AME–ALE 0.16, PME–PME 1.04, PME–PLE 0.12, ALE–PLE 0.16. OQ length 0.93, width 2.04, clypeus 0.40. Fovea transverse, procurved, width 1.66. Labium length 1.44, width 1.66, with 8 cuspules, maxillae with 63 cuspules (Fig. 1F). Sternum length 5.25, width 5.06. Posterior sigillae submarginal (Fig. 1D). Chelicerae with 10 teeth on furrow promargin (some of them smaller), and with 31/27 small teeth in proximal group behind promarginal line. Tarsi I–IV densely scopulated, scopula I–III entire, IV divided by narrow line of longer conical setae. Metatarsi I scopulate on distal half, II scopulate on distal 1/6, III apically scopulate, IV not scopulate. Tibia I with prolatero-ventral, distal double apophysis with basis fused and branches convergent, two megaspines on retrolateral branch (Fig. 4C–D). Flexion of metatarsus I retrolateral regarding retrolateral branch. Palpal bulb piriform, with developed subtriangular PI and PA with several granulations present on edge; TA present and well developed, embolus filiform, long (Figs 3, 4A–B). Palpal tibia with setose retrolateral process (Fig. 1E) and field of four spines (one basal three distal) on prolateral face. Length of leg and palpal segments in Table 1. Spination: femora I–II 1p; III 1r; IV 0; palp 1p. Patellae I–IV 0; palp 0. Tibiae I 4r, 1v; II 2p, 2r, 8v; III 4p, 3r, 4v; IV 5p, 3r,

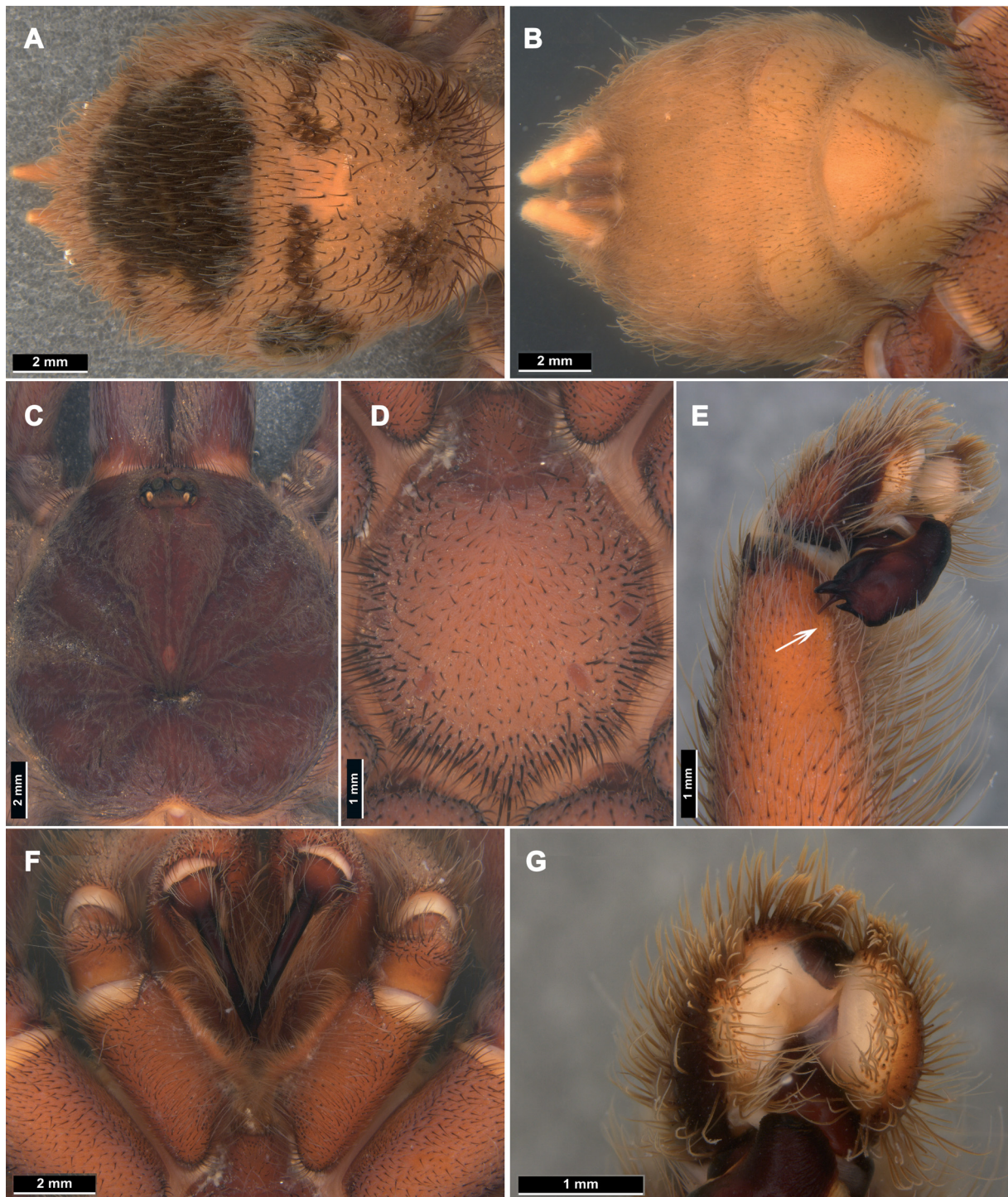


Fig. 1. *Jambu paru* gen. et sp. nov., holotype, ♂ (MPEG 7437). **A.** Abdomen, dorsal view. **B.** Abdomen, ventral view. **C.** Carapace, dorsal view. **D.** Sternum, ventral view. **E.** Distal right palp and bulb, retrolateral view (arrow shows retrolateral tibial process). **F.** Oral region, ventral view. **G.** Right cymbium, ventral view.

Table 1. Length of legs and palpal segments of male holotype of *Jambu paru* gen. et sp. nov. (MPEG 7437).

	I	II	III	IV	Palp
Fe	9.9	9.4	7.4	10.9	7.3
Pa	6.0	4.9	4.9	4.8	3.6
Ti	9.1	6.6	6.3	8.4	5.3
Mt	6.8	7.0	8.9	13.5	–
Ta	4.3	3.9	3.9	4.1	1.8
Total	36.1	31.8	31.4	41.7	18.0

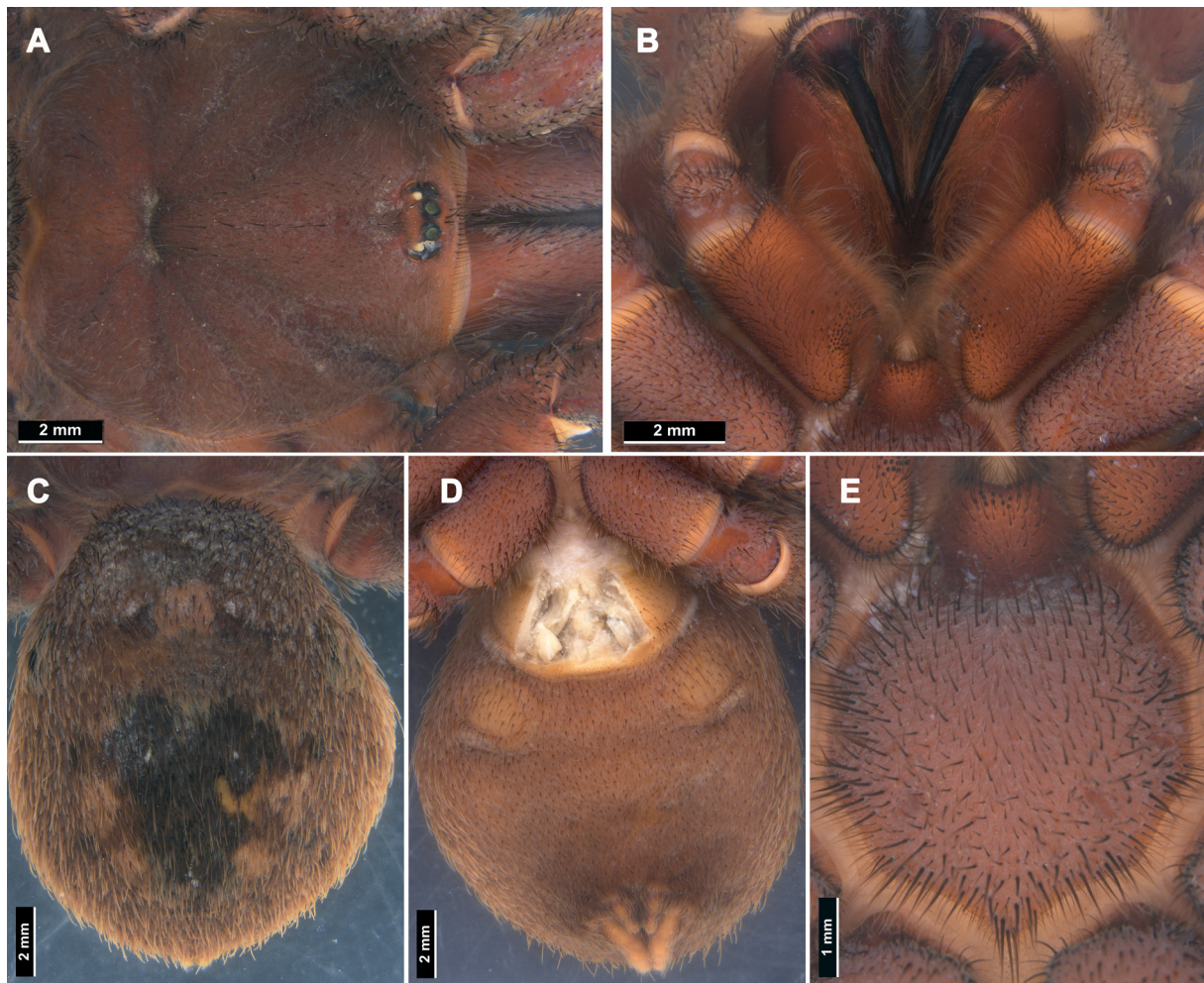
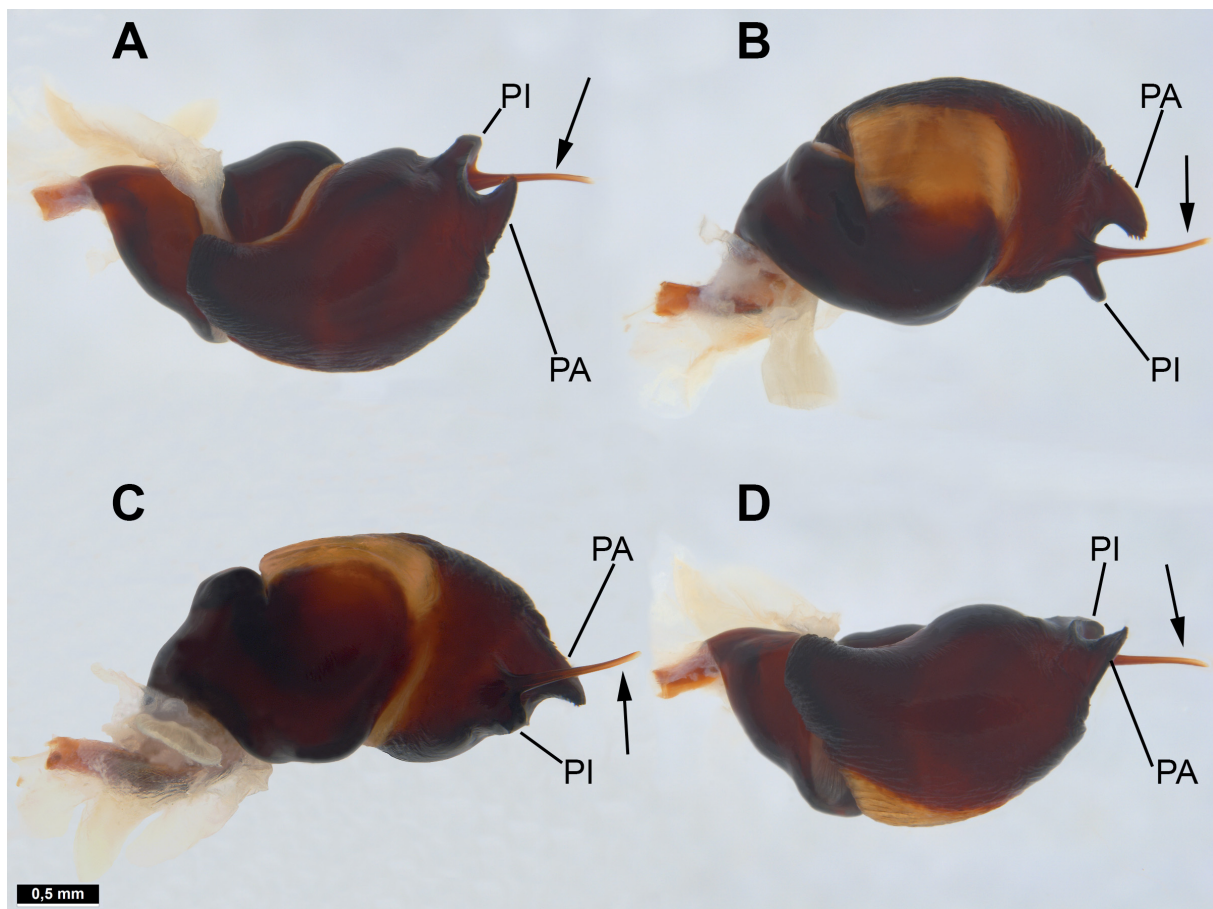


Fig. 2. *Jambu paru* gen. et sp. nov., paratype, ♀ (MPEG 7447). **A.** Carapace, dorsal view. **B.** Oral region, ventral view. **C.** Abdomen, dorsal view. **D.** Abdomen, ventral view. **E.** Sternum, ventral view.

Table 2. Length of legs and palpal segments of female paratype of *Jambu paru* gen. et sp. nov. (MPEG 7447).

	I	II	III	IV	Palp
Fe	6.2	5.5	5.1	6.3	5.0
Pa	4.3	3.2	3.5	3.3	3.2
Ti	4.2	3.1	3.0	4.6	3.3
Mt	2.9	3.2	4.6	6.7	–
Ta	2.4	2.2	2.4	2.6	4.1
Total	20	17.2	18.6	23.5	15.6

**Fig. 3.** *Jambu paru* gen. et sp. nov., holotype, ♂ (MPEG 7437), left palpal bulb. **A.** Prolateral view. **B.** Retrolateral view. **C.** Dorsal view. **D.** Ventral view. Arrows show the embolus. Abbreviations: PA = paraembolic apophysis; PI = prolateral inferior keel.

4v; palp (short spines) 11p, 1v; 4d. Metatarsi I 2p, 2r, 3v; II 2p, 4r, 4v; III 4p, 3r, 5v, 7d; IV 11p, 3r, 4v, 10d; tarsi I–IV and palp 0. Color: cephalothorax and legs and dorsal abdomen brown with pattern of two transverse lines and a spot light brown on ventral abdomen pale brown (Fig. 1). Type IV urticating setae present (Fig. 5A–B). PMS well developed, PLS normal, apical segment digitiform (Fig. 1B).

Female (paratype MPEG 7447)

Total length 23.50, carapace length 10.25, width 9.88. Anterior eye row procurved, posterior row slightly recurved. Eye sizes and interdistances: AME 0.24, ALE 0.46, PME 0.28, PLE 0.38, AME–AME 0.32, AME–ALE 0.28, PME–PME 0.96, PME–PLE 0.08, ALE–PLE 0.14. OQ length 0.80, width 1.92, clypeus 0.58. Fovea slightly procurved, width 1.72. Labium length 1.40, width 1.76, with 11 cuspules, maxillae with 72 cuspules (Fig. 2B). Sternum length 4.1, width 4.5. Posterior sigillae submarginal (Fig. 2E). Chelicerae with 11/12 teeth on furrow promargin (some of them smaller) and 19/21 smaller in group, basally, behind large ones. Tarsi densely scopulate, scopula I entire, II divided by a narrow line of longer conical setae, III–IV divided by a wide band of longer conical setae. Metatarsi I scopulate on apical half, II scopulate on apical $\frac{1}{4}$, III apically scopulate, IV without scopula. Length of leg and palpal segments in Table 11. Spination: femora I–IV and palp 0. Patellae I–IV and palp 0. Tibiae I–II 0; III 1v;

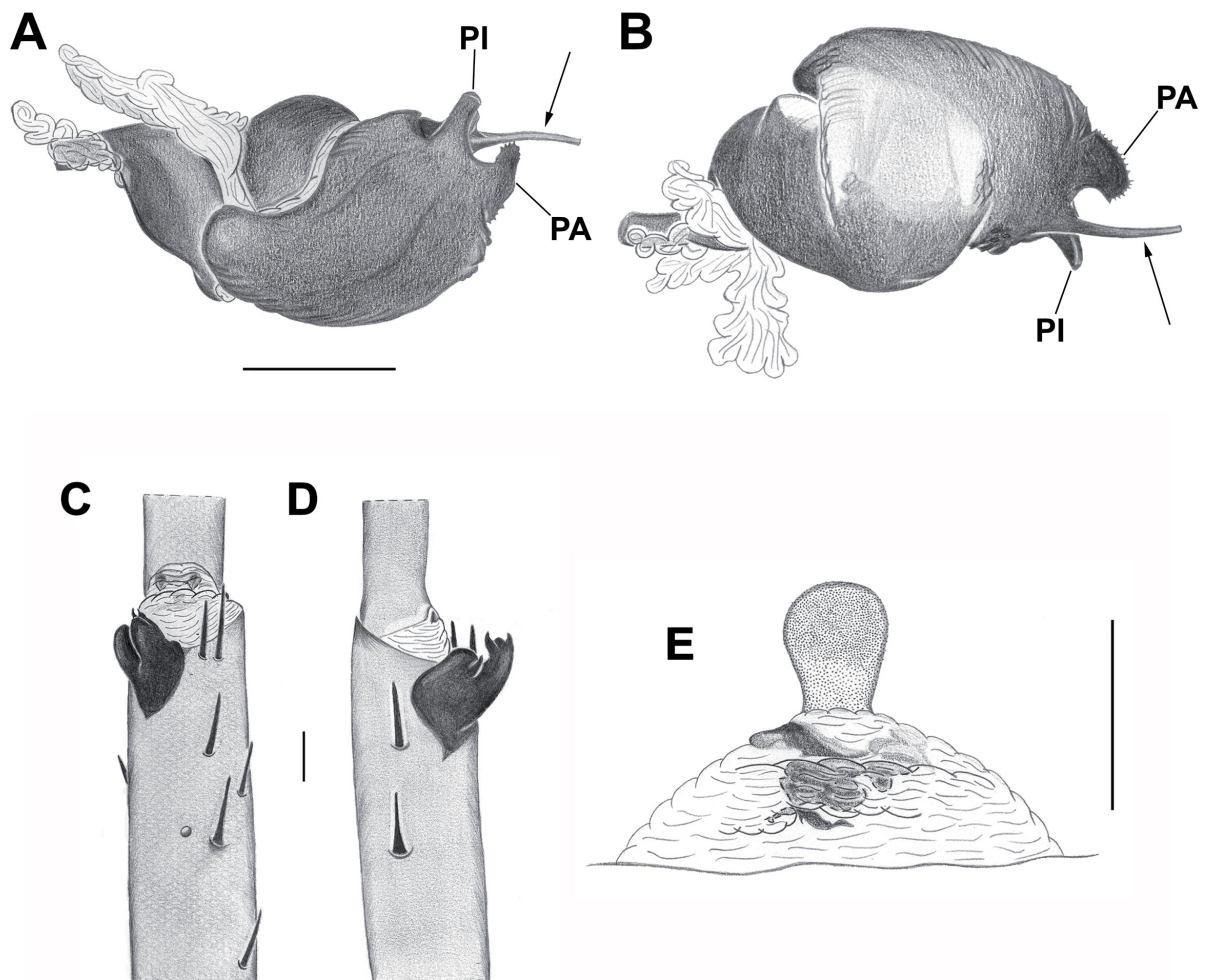


Fig. 4. *Jambu paru* gen. et sp. nov. **A–D.** Holotype, ♂ (MPEG 7437). **E.** Paratype, ♀ (MPEG 7447). **A–B.** Left palpal bulb. **A.** Proximal view. **B.** Retrolateral view. **C–D.** Left tibial apophysis. **C.** Ventral view. **D.** Proximal view. **E.** Female spermathecae, ventral view. Arrows show embolus. Abbreviations: PA = paraembolic apophysis; PI = proximal inferior keel. Scale bars = 1 mm.

IV 1v; palp 3v. Metatarsi: I 4v; II 1p 3v; III 3p, 3r, 4v, 1d; IV 4p, 6r, 7v, 1d. Palp 0. Tarsi I–IV and palp 0. Color: carapace and legs reddish brown; dorsal abdomen dark brown with two light transverse stripes and spot (Fig. 2) ventral abdomen pale brown. Type IV (central abdomen, Fig. 5C–D) and intermediate III–IV (lateral abdomen) urticating setae present. PMS slightly smaller than in male, PLS as in male (Fig. 2D). Spermathecae with one medial lamp-shaped receptacle (Fig. 4E).

Distribution

Known only from type-locality, Brazil, State of Pará, Almeirim, Jari (Fig. 10).

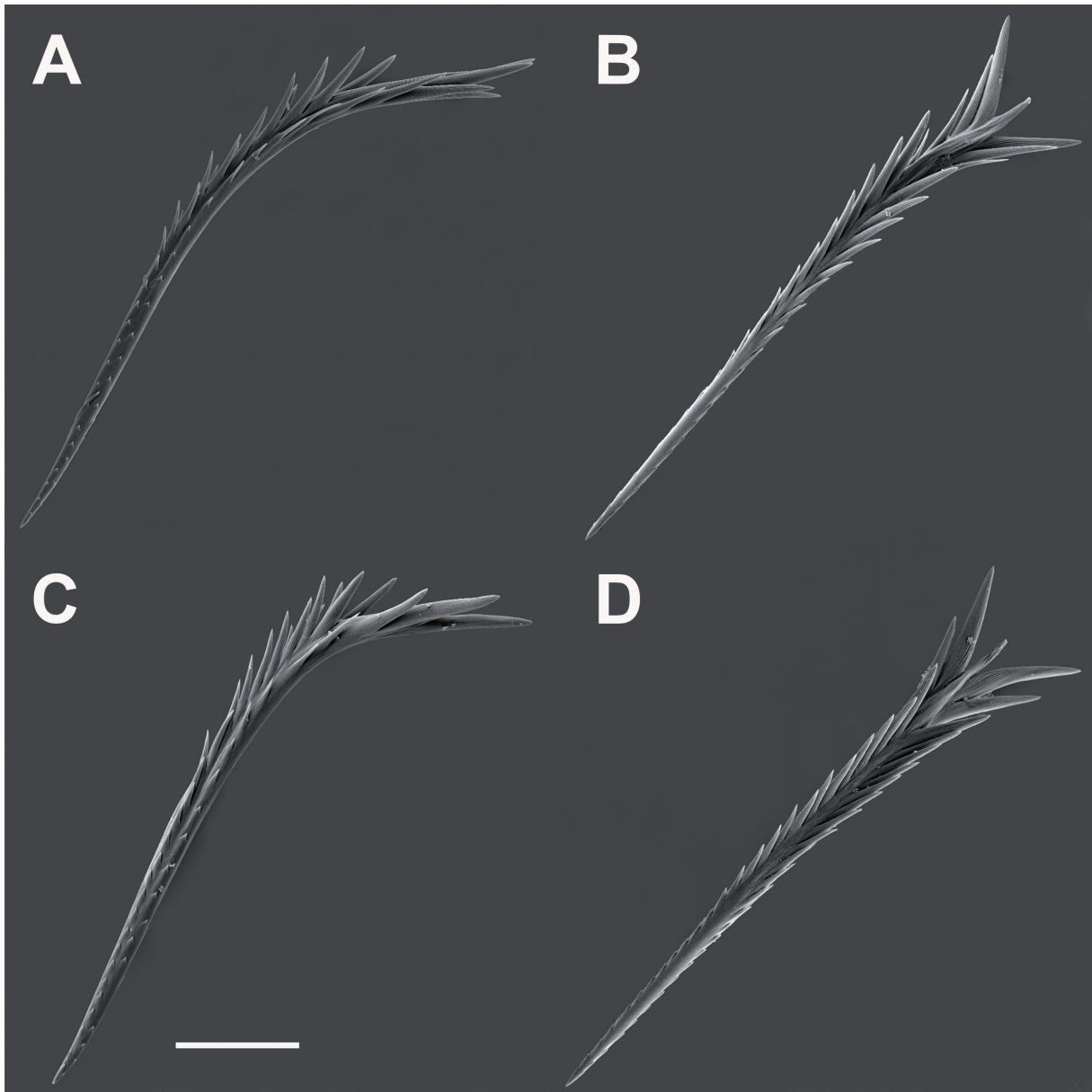


Fig. 5. *Jambu paru* gen. et sp. nov., paratypes (♂ MPEG 7442, ♀ MPEG 7440), type IV urticating setae. **A.** Male, lateral view. **B.** Male, convex face view. **C.** Female, lateral view. **D.** Female, convex face view. Scale bar = 20 μ m.

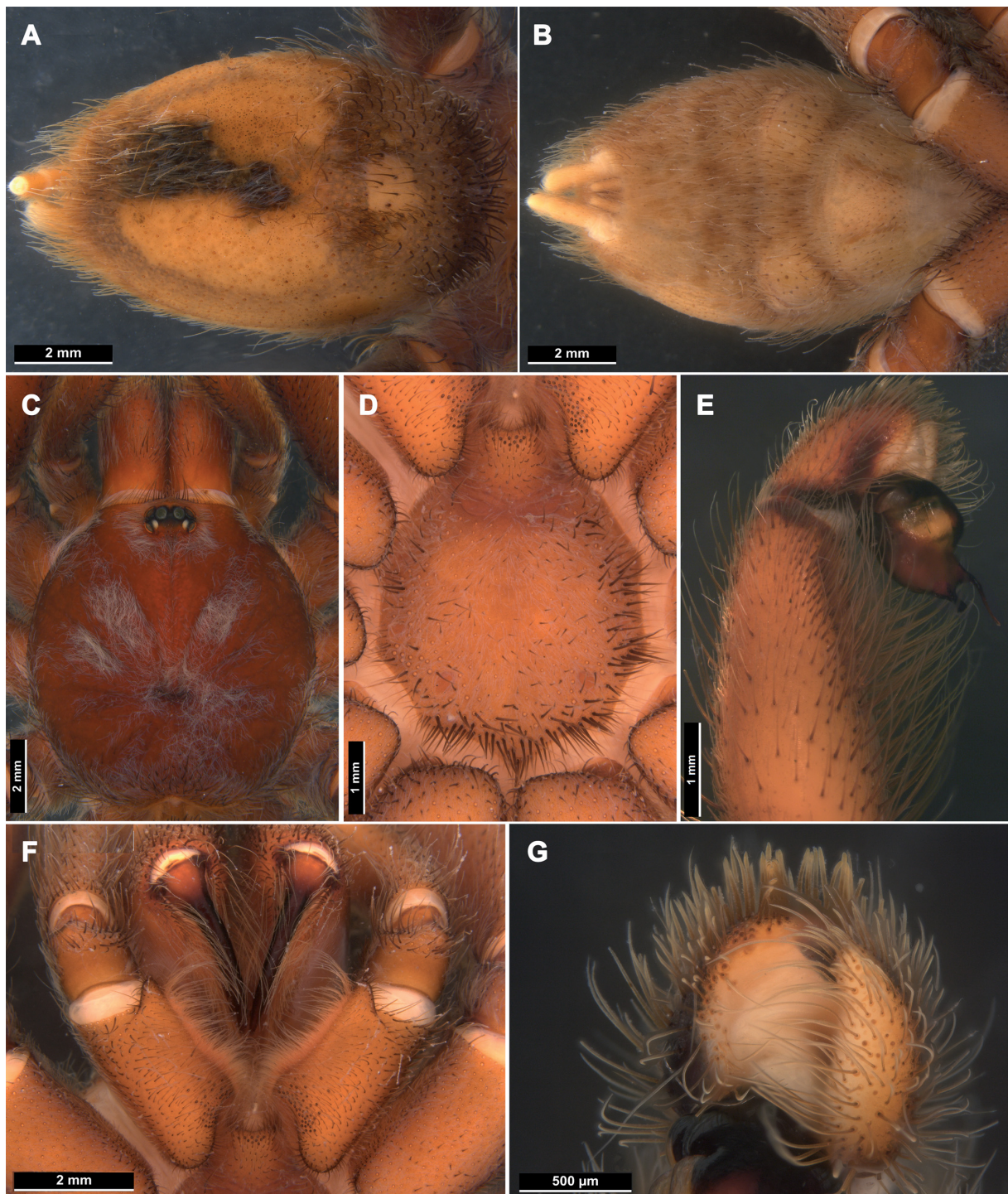


Fig. 6. *Jambu manoa* gen. et sp. nov., holotype, ♂ (INPA 6131). **A.** Abdomen, dorsal view. **B.** Abdomen, ventral view. **C.** Carapace, dorsal view. **D.** Sternum, ventral view. **E.** Distal right palp and bulb, retrolateral view. **F.** Oral region, ventral view. **G.** Right cymbium, ventral view.

Jambu manoa gen. et sp. nov.

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Figs 6–10; Table 3

Diagnosis

Males differ from those of *J. paru* gen. et sp. nov. and *J. butantan* gen. et comb. nov. by the absence of PI on the palpal bulb (Figs 7, 8A–B) and in the absence of a retrolateral process on the palpal tibia (Fig. 6E). Additionally, males differ from those of *J. butantan* in the morphology of PA wide and dentate (acute and not dentate in *J. butantan*) and in the absence of PS. Female unknown.

Etymology

The specific epithet is a noun in apposition which refers to an ancestral indigenous city located in a region later known as El Dorado.

Type material

Holotype

BRAZIL • ♂; Amazonas, Barcelos, Serra de Aracá; 0°51'59" N, 63°26'51" W; 1–4 Aug. 2008; A.A. Nogueira leg.; INPA 6131.

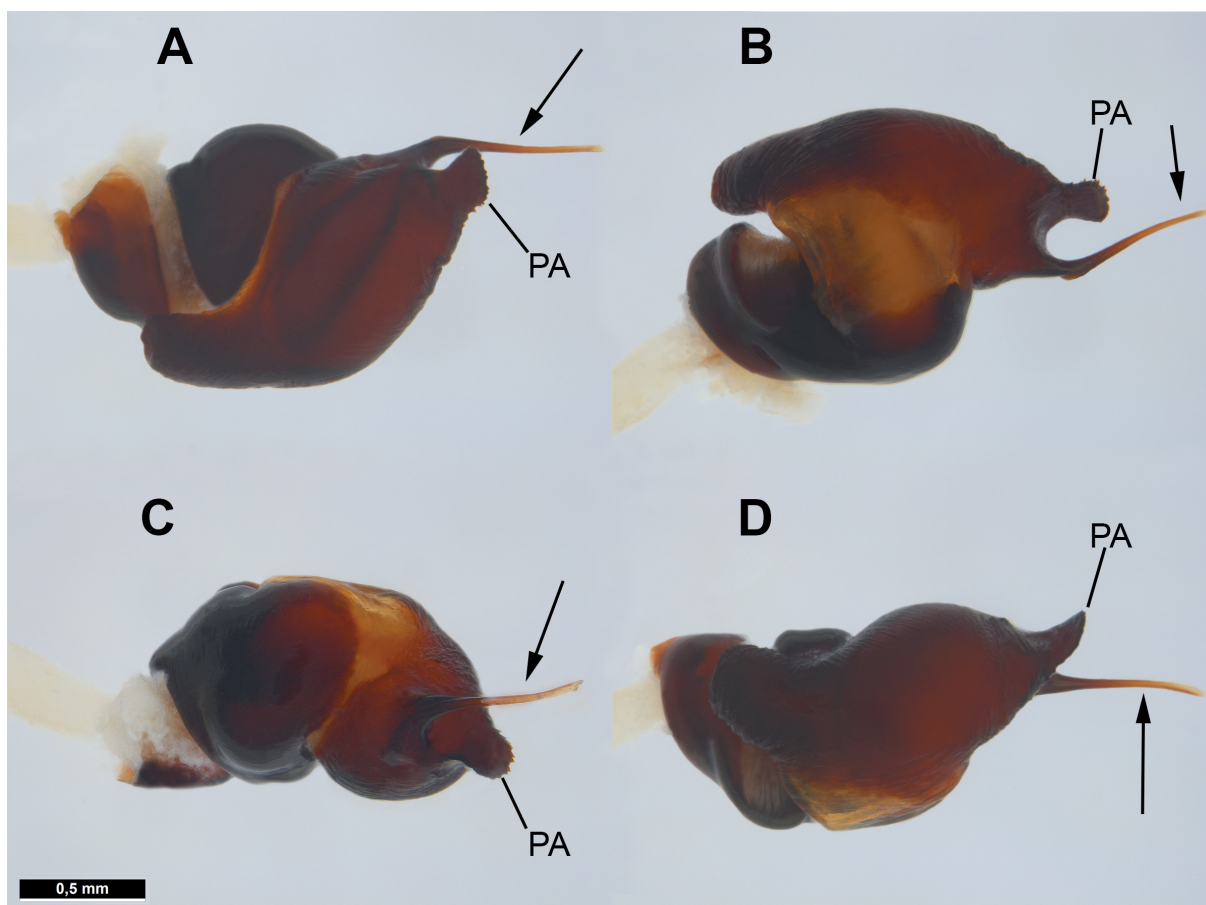


Fig. 7. *Jambu manoa* gen. et sp. nov., holotype, ♂ (INPA 6131), left palpal bulb. **A.** Prolateral view. **B.** Retrolateral view. **C.** Dorsal view. **D.** Ventral view. Arrows show the embolus. Abbreviation: PA = paraembolic apophysis.

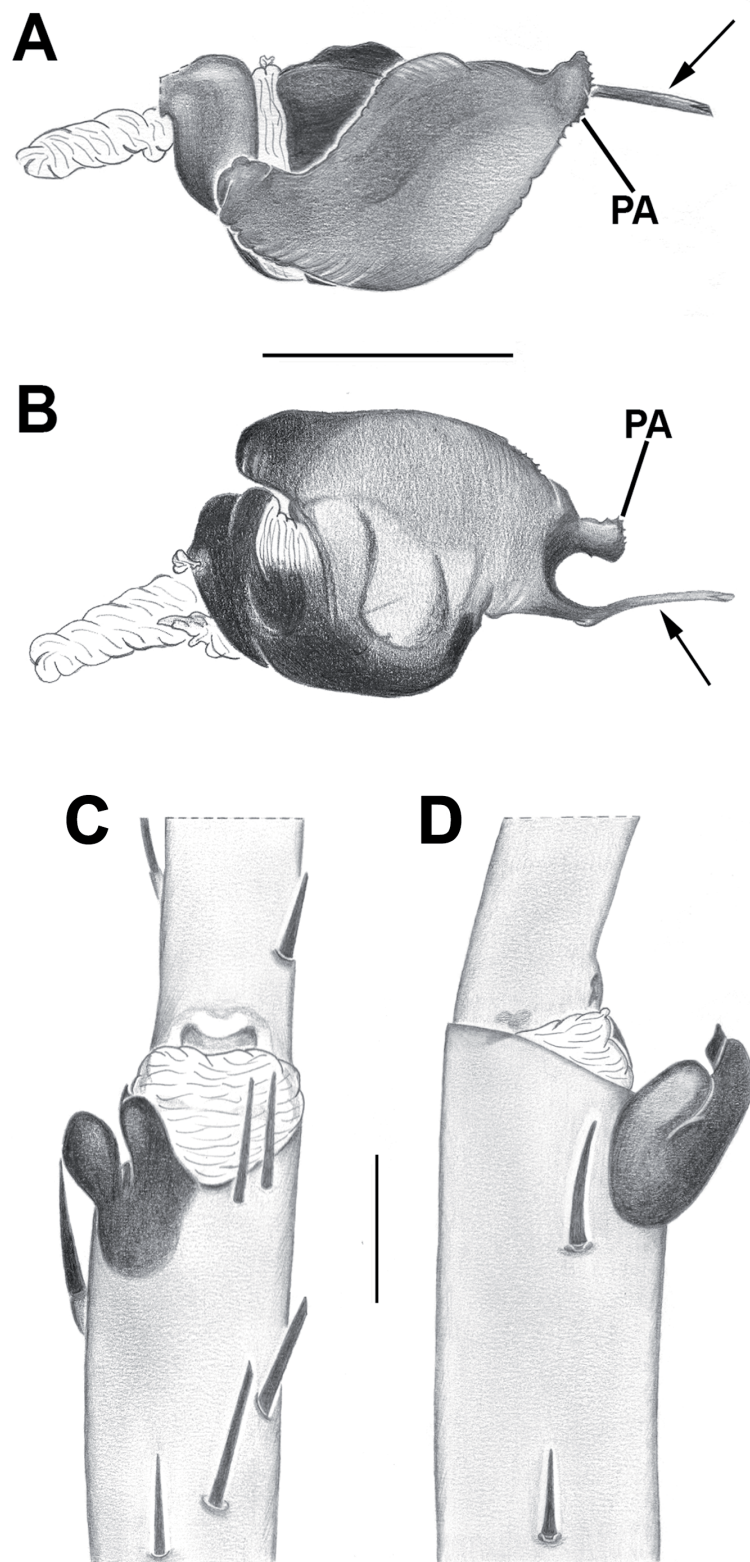


Fig. 8. *Jambu manoa* gen. et sp. nov., holotype, ♂ (INPA 6131). **A–B.** Male left palpal bulb. **A.** Prolateral view. **B.** Retrolateral view. **C–D.** Male left tibial apophysis. **C.** Ventral view. **D.** Prolateral view. Arrows show embolus. Abbreviation: PA = paraembolic apophysis. Scale bars = 1 mm.

Table 3. Length of legs and palpal segments of holotype male *Jambu manoa* gen. et sp. nov. (INPA 6131).

	I	II	III	IV	Palp
Fe	6.5	6.3	5.8	7.7	3.6
Pa	3.9	3.2	2.9	3.2	2.5
Ti	5.0	4.4	3.9	6.0	4.0
Mt	4.6	4.5	5.6	9.0	–
Ta	2.8	2.5	2.5	2.6	0.9
Total	22.8	20.9	20.7	28.5	11.0

Description

Male (holotype INPA 6131)

Total length 17.00, carapace length 7.75, width 7.63. Anterior eye row procurved, posterior recurve. Eye sizes and interdistances: AME 0.38, ALE 0.38, PME 0.26, PLE 0.32, AME–AME 0.18, AME–ALE 0.16, PME–PME 0.64, PME–PLE 0.10, ALE–PLE 0.10. OQ length 0.72, width 1.44, clypeus 0.20. Fovea transverse, procurved, width 0.88. Labium length 1.13, width 1.63, with 10 cuspules, maxillae with 57 cuspules (Fig. 6F). Sternum length 3.50, width 3.50. Posterior sigillae submarginal (Fig. 6D). Chelicerae with 11/10 teeth on furrow promargin (7–9 teeth, smaller), and with 12/13 small teeth in proximal group behind promarginal line. Tarsi I–IV densely scopulate, scopula I–II entire, III–IV divided by a narrow line of longer conical setae on the distal part. Metatarsi I scopulate on distal $\frac{1}{3}$, II on distal $\frac{1}{4}$,

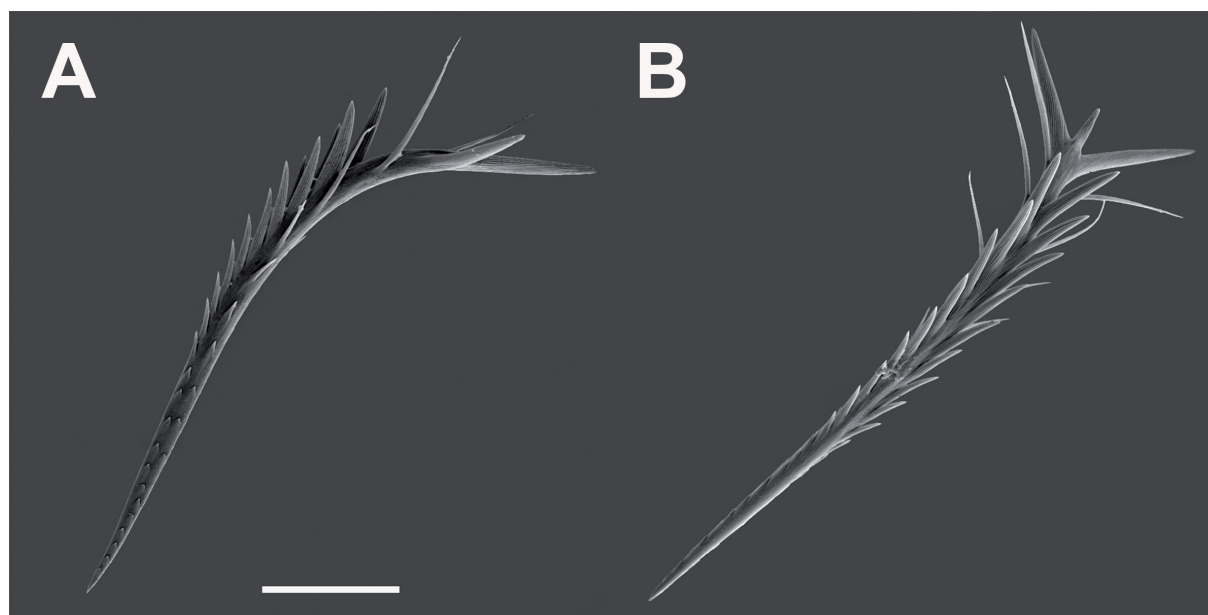


Fig. 9. *Jambu manoa* gen. et sp. nov., holotype, ♂ (INPA 6131), type IV urticating setae. **A.** Lateral view. **B.** Convex face view. Scale bar = 20 μ m.

III on distal $\frac{1}{5}$, IV not scopulate. Tibia I with prolatero-ventral, distal double apophysis with basis fused and branches convergent, short thick spine on apex of retrolateral branch (Fig. 8C–D). Flexion of metatarsus I retrolateral regarding retrolateral branch. Palpal bulb piriform with PA well developed and with granulations, embolus long (Figs 7, 8A–B); tegular apophysis present and well developed. Palpal tibia without retrolateral process (Fig. 6E). Length of leg and palpal segments in Table 3. Spination: femora I–II 1p; III 1p, 1d; IV 1d; palp 1p. Patellae I–II 0; III 2p; IV 1p, 1r; palp 0. Tibiae I 4r, 2p, 2v; II 2p, 2r, 4v; III 2p, 2r, 6v; IV 4p, 2r, 4v; palp 9p. Metatarsi I 2p, 5v; II 2p, 2r, 5v; III 3p, 2r, 8v; IV 5p, 7r, 5v; tarsi I–IV and palp 0. Color: cephalothorax, legs and abdomen brown, tarsi light brown; carapace has longer yellow setae (Fig. 6). Type IV urticating setae present (Fig. 7). PMS well developed, PLS normal, apical segment digitiform (Fig. 7D).

Distribution

Known only from the type-locality, Serra do Aracá, State of Amazonas, Brazil (Fig. 10).

Jambu butantan (Pérez-Miles, 1998) gen. et comb. nov.

Cyriocosmus butantan Pérez-Miles, 1998: 96, figs 1–7.

Cyriocosmus butantan – Schmidt 2003:158, fig. 318.

Hapalopus butantan – Fukushima *et al.* 2005: 19, figs 51–55.

Comments

Jambu butantan gen. et comb. nov. was the only species attributed to *Hapalopus* and Hapalopini with type IV urticating setae (Pérez-Miles 1998; Fukushima *et al.* 2005; Kaderka 2019; Kaderka *et al.* 2019), which is considered a diagnostic feature of Grammostolini (Turner *et al.* 2018). Probably its previous classification in *Cyriocosmus* by Pérez-Miles (1998) and *Hapalopus* by Fukushima *et al.* (2005) was due to the presence of a paraembolic apophysis on the male palpal bulb. At that time this feature was only known in these Hapalopini genera. The presence of urticating setae IV together with paraembolic apophysis in *Jambu* gen. nov. lead us to transfer the species and propose *Jambu butantan*.

Emended diagnosis

Males can be differentiated from those of *J. manoa* gen. et sp. nov. and *J. paru* gen. et sp. nov. in the morphology of the PA, acute and not serrate, the presence of a PS, and the presence of a palpal tibial apophysis with two megaspines. Females differ from those of other species by the heart-shaped sclerotized spermathecae.

Material examined

Holotype

BRAZIL • ♂; Amazonas, Balbina, Presidente Figueredo; [1°55'16" S, 59°28'05" W]; 13 Jan. 1988; team of collectors from IB; IB65 (examined).

Additional material

BRAZIL • 1 ♀; Pará, Jurutí, Acampamento Mutum, Mutum; 01°36'44" S, 56°11'39" W; 7 Feb. 2007; N.F. Lo-Man-Hung leg.; MPEG 10006 • 1 ♀; Amazonas, Presidente Figueiredo, UHE Balbina; [01°55'02" S, 59°28'25" W]; 14 Jan. 1988; B. Mascarenhas leg.; MPEG 5381 • 1 ♀; Reserva Biológica do Uatumã, Cipoal; 01°42'34" S, 59°46'41" W; 11 Aug. 2006; R. Saturnino leg.; MPEG 15627 • 1 ♀; Folharal; 01°44'41" S, 59°46'03" W; 10 Aug. 2006; R. Saturnino leg.; MPEG 15628 • 1 ♀, 1 juv.; Ilha do Josué; 01°47'39" S, 59°38'33" W; 26 Jul. 2006; R. Saturnino leg.; MPEG 15629 • 1 ♀, 2 ♂♂; Mata Contínua; 01°47'57" S, 59°15'41" W; 27 Sep. 2006; R. Saturnino leg.; MPEG 15625, 15626 • 1 ♂; Interflúvio Madeira-Purus; [04°29' S, 60°07' W]; 6 Jun. 2007; S.M. Souza leg.; INPA 8803 • 1 ♀; same

locality as for preceding; 3 Jul. 2007; E.H. Wienskoski leg.; INPA 8805 • 1 ♀, 1 juv.; Acampamento; 04°29'26" S, 60°07'53" W; 6 Jul. 2007; L.T. Miglio and E.H. Wienskoski leg.; INPA 8804 • 1 ♀; Pará, Juruti, Km 26 da Ferrovia; [02°09'48" S, 56°05'42" W]; 9 May 2007; A. Lima, P. Suarez and A.J. Baia Goes leg.; MPEG 19052 • 1 ♀, 1 ♂; Km 32 da Ferrovia; [02°09'48" S, 56°05'42" W]; 14–15 Feb. 2007; Equipe Resgate de Fauna leg.; MPEG 19079, MPEG 19069 • 2 ♂♂; Capiroanga, Obras Aduadora; [02°09'48" S, 56°05'42" W]; 18 Nov. 2007; E.S. Santos leg.; MPEG 19060, 19062 • 2 ♀♀; Piçarra; [02°09'48" S, 56°05'42" W]; 19 Nov. 2007; N.F. Lo-Man-Hung and D.F. Candiani leg.; MPEG 19063, 19064 • 1 ♀; Sítio 3 Irmãos, Barroso; 02°27'45" S, 56°00'51" W; 12 Aug. 2008; L.T. Miglio leg.; MPEG 19078; 1 ♀; same collection data as for preceding; N.C. Bastos leg.; MPEG 19073; 2 ♀♀; same collection data as for preceding; N.F. Lo-Man-Hung leg.; MPEG 19068, 19075 • 2 ♀♀; same collection data as for preceding; N.F. Lo-Man-Hung, L.T. Miglio and N.C. Bastos leg.; MPEG 19076, 19081 • 1 ♂, 1 ♀; Sítio Barroso, Barroso; 02°27'51" S, 56°00'08" W; 3 Mar. 2006; S.C. Dias leg.; MPEG 9020, 9025 • 1 ♀; same locality as for preceding; 7 Mar. 2006; D.R. Santos-Souza leg.; MPEG 9030 • 1 ♀; same locality as for preceding; 14 Feb. 2007; A. Lima, P. Suarez and S.H.F. Abrantes leg.; MPEG 19071 • 1 ♀; same locality as for preceding; 15 Feb. 2007; A. Lima, P. Suarez and S.H.F. Abrantes leg.; MPEG 19072 • 1 ♀; Capoeira Baixa, Base Capiroanga; 02°28'0" S, 56°12'42" W; 4–11 Sep. 2002; A.B. Bonaldo leg.; MPEG 229 • 1 ♀; same locality as for preceding; 7 Nov. 2002; A.B. Bonaldo leg.; MPEG 230 • 1 ♂; Km 2 Ramal Pacoval, Pacoval; 2°28'0" S, 56°12'42" W; 21 Nov. 2007; C.M. de Souza leg.; MPEG 19074 • 2 ♀♀; same locality as for preceding; E.S. Santos leg.; MPEG 19057, 19059 • 2 ♀♀; same locality as for preceding; N.F. Lo-Man-Hung leg.; MPEG 19056, 19061 • 1 ♂, 1 ♀; Sítio Barroso, Barroso; 02°28'10" S, 56°00'3" W; 15 Feb. 2007; A. Lima, P. Suarez and S.H.F. Abrantes leg.; MPEG 19050 • 1 ♂; same collection data as for preceding; 16 Nov. 2007; D.F. Candiani leg.; MPEG 19054 • 1 ♀; Beneficiamento Bauxita; 02°28'22" S, 56°12'29" W; 15 Feb. 2007; Equipe Resgate de Fauna leg.; MPEG 19080 • 1 ♀; Platô Capiroanga, Linha 168E, Capiroanga; 02°28'22" S, 56°12'29" W; 9 Aug. 2006; N.F. Lo-Man-Hung leg.; MPEG 8594 • 1 ♀; same locality as for preceding; 12 Aug. 2006; D.F. Candiani leg.; MPEG 8615 • 2 ♀♀; same locality as for preceding; 11 Aug. 2008; N.C. Bastos leg.; MPEG 19053, 19067 • 2 ♂♂; Capiroanga; 02°30'25" S, 56°11'04" W; 10 Feb. 2007; J.A.P. Barreiros leg.; MPEG 19065 • 1 ♂; same locality as for preceding; 14 Feb. 2007; A. Lima, P. Suarez and S.H.F. Abrantes leg.; MPEG 19082 • 1 ♀; same locality as for preceding; 9 May 2009; N.C. Bastos leg.; MPEG 19058 • 1 ♀; Mutum; 02°33'06" S, 56°13'29" W; 11 Aug. 2010; B.V.B. Rodrigues leg.; MPEG 19055 • 1 ♀; same locality as for preceding; 5 Sep. 2014; M.B. Aguiar-Neto leg.; MPEG 31787 • 1 ♀; Platô do Rio Juruti; 02°33'07" S, 56°13'06" W; 11–16 Sep. 2002; MPEG 1097 • 1 ♂, 1 ♀; same locality as for preceding; Feb. 2007; T.C.S. Ávila-Pires *et al.* leg.; MPEG 19024 • 1 ♀; Mutum; 02°34'38" S, 56°13'18" W; 7 Sep. 2014; E.L.S. da Costa leg.; MPEG 31788 • 1 ♀; Acampamento Mutum; 02°36'10" S, 56°12'25" W; 6 Sep. 2002; D.D. Guimarães leg.; MPEG 1094 • 1 ♀; same locality as for preceding; 14 Sep. 2002; D.D. Guimarães leg.; MPEG 1931 • 2 ♀♀; same locality as for preceding; 02°36'11" S, 56°12'36" W; 4 Aug. 2004; D.R. Santos-Souza leg.; MPEG 1952, 1980 • 1 ♀; same locality as for preceding; D.F. Candiani leg.; MPEG 1979 • 1 ♀; same locality as for preceding; 5 Aug. 2004; D.R. Santos-Souza leg.; MPEG 1953 • 1 ♂, 1 ♀; same locality as for preceding; 10 Jun. 2007; D.F. Candiani and N.F. Lo-Man-Hung col.; MPEG 19077; 19051 • 1 ♂; same locality as for preceding; 24 May 2009; N. Abraham leg.; MPEG 19070 • 1 ♂; Próximo ao Igarapé Mutum; 02°36'44" S, 56°11'39" W; 8 Feb. 2007; A. Lima, P. Suarez and S.H.F. Abrantes leg.; MPEG 19066 • 4 ♂♂; Acampamento Mutum; 2°36'45" S, 56°11'38" W; 8–15 Aug. 2006; D.F. Candiani and N.F. Lo-Man-Hung leg.; MPEG 8601, 8602, 8604 • 1 ♀; same locality as for preceding; 10 Aug. 2006; D.F. Candiani and N.F. Lo-Man-Hung leg.; MPEG 8600 • 1 ♀; same locality as for preceding; N.F. Lo-Man-Hung leg.; MPEG 8636 • 1 ♀; same locality as for preceding; 13 Aug. 2006; Equipe Herpetologia leg.; MPEG 8618.

Distribution

Previously known from the State of Amazonas, Brazil, and herein extended also to the State of Pará, Brazil (Fig. 10).



Fig. 10. Geographic distribution of the species of *Jambu* gen. nov.

Discussion

The importance of the use of urticating setae types as taxonomic characters for theraphosid groups has been emphasized in recent decades (Turner *et al.* 2018; Foley *et al.* 2019; Kaderka *et al.* 2019). Using molecular characters, Turner *et al.* (2018) proposed three tribes for the subfamily Theraphosinae: Theraphosini, Hapalopini and Grammostolini, the last one also characterized by the presence of type IV urticating setae. The species of *Jambu* gen. nov. present urticating setae type IV which suggests affiliation to the Grammostolini, following Turner *et al.* (2018). Up to now, the presence of a paraembolic apophysis has been only known in the Hapalopini genera *Cyriocosmus* and in some species of *Hapalopus*. The paraembolic apophysis has been considered a synapomorphy of *Cyriocosmus* (Simon 1903; Raven 1985; Pérez-Miles 1998; Fukushima *et al.* 2005; Kaderka 2016, 2019). However, as indicated Fukushima *et al.* (2005) early for *H. butantan* and what we found here for *Jambu*, the position of the paraembolic apophysis is situated ventrally to the embolus (contrary to *Cyriocosmus*). Consequently, the paraembolic apophysis of *Jambu* seems not to be a homologous feature in Hapalopini. As suggested by Pérez-Miles & Perafán (2020), a new analysis of the palpal bulb homology seems to be necessary, mainly considering that after the first proposal of Bertani (2000) many theraphosid genera have been described.

Females of *Jambu* gen. nov. differ from those of all other genera of Grammostolini by the presence of a single fused spermatheca. All other genera with fused spermathecae correspond to other tribes of Theraphosinae (e.g., Hapalopini, Theraphosini) or other subfamilies of Theraphosidae which mostly lack type IV urticating setae. With the proposal of *Jambu*, and the transfer of the only Hapalopini with urticating setae type IV to this new genus of Grammostolini, the presence of this character could be a synapomorphy of this group.

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References

- Bertani R. 2000. Male palpal bulbs and homologous features in Theraphosinae (Araneae, Theraphosidae). *Journal of Arachnology* 28: 29–42. [https://doi.org/10.1636/0161-8202\(2000\)028\[0029:MPBAHF\]2.0.CO;2](https://doi.org/10.1636/0161-8202(2000)028[0029:MPBAHF]2.0.CO;2)
- Bertani R. & Almeida M.Q. 2021. *Yanomamius* n. gen., a new genus of tarantula from Brazilian and Venezuelan Amazon (Araneae, Theraphosidae), with description of three new species. *Zootaxa* 4933 (3): 324–340. <https://doi.org/10.11646/zootaxa.4933.3.2>
- Bertani R. & Guadanucci J.P.L. 2013. Morphology, evolution and usage of urticating setae by tarantulas (Araneae: Theraphosidae). *Zoologia* 30 (4): 403–418. <https://doi.org/10.1590/S1984-46702013000400006>
- Biswas A., Chaitanya R. & Karanth K.P. 2023. The tangled biogeographic history of tarantulas: An African centre of origin rules out the centrifugal model of speciation. *Journal of Biogeography* 50 (8): 1341–1351. <https://doi.org/10.1111/jbi.14678>
- Cooke J.A., Roth V.D. & Miller F. 1972. The urticating hairs of Theraphosidae. *American Museum Novitates* 2498: 1–43. Available from <http://hdl.handle.net/2246/2705> [accessed 5 Mar. 2024].
- Ferretti N.E. 2021. First record of the tarantula genus *Bumba* (Araneae: Theraphosidae) from Bolivia, with the description of a new species. *Iheringia, Série Zoologia* 111: e2021025. <https://doi.org/10.1590/1678-4766e2021025>
- Ferretti N., Chaparro J.C., Ochoa J.A. & West R. 2023. A new tarantula (Mygalomorphae: Theraphosidae) genus endemic from Peru with a novel genitalic morphology among theraphosinae and its phylogenetic placement. *Zoologischer Anzeiger* 302: 102–112. <https://doi.org/10.1016/j.jcz.2022.11.011>
- Foley S., Lüddecke T., Cheng D.-Q., Krehenwinkel H., Künzel S., Longhorn S.J., Wendt I., Wirth V. von, Tänzler R., Vences M. & Piel W.H. 2019. Tarantula phylogenomics: a robust phylogeny of deep theraphosid clades inferred from transcriptome data sheds light on the prickly issue of urticating setae evolution. *Molecular Phylogenetics and Evolution* 140: 106573. <https://doi.org/10.1016/j.ympev.2019.106573>
- Foley S., Krehenwinkel H., Cheng D.Q. & Piel W.H. 2021. Phylogenomic analyses reveal a Gondwanan origin and repeated out of India colonizations into Asia by tarantulas (Araneae: Theraphosidae). *PeerJ* 9: e11162. <https://doi.org/10.7717/peerj.11162>

- Fonseca-Ferreira R., Zampaulo R.A. & Guadanucci J.P.L. 2017. Diversity of iron cave-dwelling mygalomorph spiders from Pará, Brazil, with description of three new species (Araneae). *Tropical Zoology* 30: 178–199. <https://doi.org/10.1080/03946975.2017.1367590>
- Fukushima C.S. & Bertani R. 2017. Taxonomic revision and cladistic analysis of *Avicularia* Lamarck, 1818 (Araneae, Theraphosidae, Aviculariinae) with description of three new aviculariine genera. *ZooKeys* 659: 1–185, Suppl. 1–5. <https://doi.org/10.3897/zookeys.659.10717>
- Fukushima C.S., Bertani R. & da Silva Jr P.I. 2005. Revision of *Cyriocosmus* Simon, 1903, with notes on the genus *Hapalopus* Ausserer, 1875 (Araneae, Theraphosidae). *Zootaxa* 846: 1–31. <https://doi.org/10.11646/zootaxa.846.1.1>
- Gabriel R. 2014. A new genus and species of theraphosid spider from El Salvador (Araneae: Theraphosidae). *British Tarantula Society Journal* 29 (3): 146–153.
- Gabriel R. 2016. Revised taxonomic placement of the species in the Central American genera *Davus* O. Pickard-Cambridge, 1892, *Metriopelma* Becker, 1878, and *Schizopelma* F.O. Pickard-Cambridge, 1897, with comments on species in related genera (Araneae: Theraphosidae). *Arachnology* 17: 61–92. <https://doi.org/10.13156/ arac.2006.17.2.61>
- Gabriel R. & Sherwood D. 2019. The revised taxonomic placement of the three species of *Psalmopoeus* Pocock, 1895 described by R.I. Pocock in 1903 (Araneae: Theraphosidae). *Arachnology* 18 (1): 40–46. <https://doi.org/10.13156/ arac.2018.18.1.40>
- Gabriel R. & Sherwood D. 2020a. Revised taxonomic placement of *Pseudhapalopus* Strand, 1907, with notes on some related taxa (Araneae: Theraphosidae). *Arachnology* 18 (4): 301–316. <https://doi.org/10.13156/ arac.2020.18.4.301>
- Gabriel R. & Sherwood D. 2020b. Revised taxonomic placement of some Mesoamerican *Psalmopoeus* Pocock, 1895, with description of three new species (Araneae: Theraphosidae). *Arachnology* 18 (4): 387–398. <https://doi.org/10.13156/ arac.2020.18.4.387>
- Kaderka R. 2016. The Neotropical genus *Cyriocosmus* Simon, 1903 and new species from Peru, Brazil and Venezuela (Araneae: Theraphosidae: Theraphosinae). *Journal of Natural History* 50 (7–8): 393–465. <https://doi.org/10.1080/00222933.2015.1076082>
- Kaderka R. 2019. The genus *Cyriocosmus* Simon 1903 and two new species from Peru (Araneae: Theraphosidae: Theraphosinae). *Revista Peruana de Biología* 26 (4): 543–550. <https://doi.org/10.15381/rpb.v26i4.17215>
- Kaderka R., Bulantová J., Heneberg P. & Řezáč M. 2019. Urticating setae of tarantulas (Araneae: Theraphosidae): morphology, revision of typology and terminology and implications for taxonomy. *PLoS One* 14 (11): e0224384. <https://doi.org/10.1371/journal.pone.0224384>
- Kaderka R., Ferretti N., Hüsser M., Lüddecke T. & West, R. 2021. *Antikuna*, a new genus with seven new species from Peru (Araneae: Theraphosidae: Theraphosinae) and the highest altitude record for the family. *Journal of Natural History* 55 (21–22): 1335–1402. <https://doi.org/10.1080/00222933.2021.1936680>
- Longhorn S.J. & Gabriel R. 2019. Revised taxonomic status of some Mexican and Central American tarantulas (Araneae: Theraphosidae), with transfers from *Aphonopelma* Pocock, 1901, and a new genus from the Pacific lowlands of Nicaragua and Costa Rica. *Arachnology* 18 (2): 101–120. <https://doi.org/10.13156/ arac.2018.18.2.101>
- Lüddecke T., Krehenwinkel H., Canning G., Glaw F., Longhorn S.J., Tänzler R., Wendt I. & Vences M. 2018. Discovering the silk road: nuclear and mitochondrial sequence data resolve the phylogenetic relationships among theraphosid spider subfamilies. *Molecular Phylogenetics and Evolution* 119: 63–70. <https://doi.org/10.1016/j.ympev.2017.10.015>

- Mendoza J., Locht A., Kaderka R., Medina F. & Pérez-Miles F. 2016. A new genus of theraphosid spider from Mexico, with a particular palpal bulb structure (Araneae, Theraphosidae, Theraphosinae). *European Journal of Taxonomy* 232: 1–28. <https://doi.org/10.5852/ejt.2016.232>
- Mori A. & Bertani R. 2020. Revision and cladistic analysis of *Psalistops* Simon, 1889, *Trichopelma* Simon, 1888 and *Cyrtogrammomma* Pocock, 1895 (Araneae: Theraphosidae) based on a cladistic analysis of relationships of Theraphosidae, Barychelidae and Paratropididae. *Zootaxa* 4873 (1): 1–132. <https://doi.org/10.11646/zootaxa.4873.1.1>
- Perafán C. & Pérez-Miles F. 2014. The Andean tarantulas *Euathlus* Ausserer, 1875, *Paraphysa* Simon, 1892 and *Phrixotrichus* Simon, 1889 (Araneae: Theraphosidae): phylogenetic analysis, genera redefinition and new species descriptions. *Journal of Natural History* 48 (39–40): 2389–2418. <https://doi.org/10.1080/00222933.2014.902142>
- Perafán C., Galvis W., Gutiérrez M. & Pérez-Miles F. 2016. *Kankuamo*, a new theraphosid genus from Colombia (Araneae, Mygalomorphae), with a new type of urticating setae and divergent male genitalia. *ZooKeys* 601: 89–109. <https://doi.org/10.3897/zookeys.601.7704>
- Pérez-Miles F. 1994. Tarsal scopula division in Theraphosinae (Araneae, Theraphosidae): its systematic significance. *Journal of Arachnology* 22: 46–53.
- Pérez-Miles F. 1998. Revision and phylogenetic analysis of the neotropical genus *Cyriocosmus* Simon, 1903 (Araneae, Theraphosidae). *Bulletin of the British Arachnological Society* 11: 95–103.
- Pérez-Miles F. & Perafán C. 2020. Theraphosinae. In: Pérez-Miles (ed.) *New World Tarantulas, Taxonomy, Biogeography and Evolutionary Biology of Theraphosidae*: 121–151. Zoological Monographs 6, Springer, Cham. https://doi.org/10.1007/978-3-030-48644-0_5
- Pérez-Miles F., Lucas S.M., da Silva P.I. & Bertani R. 1996. Systematic revision and cladistic analysis of Theraphosinae (Araneae: Theraphosidae). *Mygalomorph* 1: 33–68.
- Pérez-Miles F., Gabriel R., Miglio L.T., Bonaldo A.B., Gallon R., Jimenez J.J. & Bertani R. 2008. *Ami*, a new theraphosid genus from Central and South America, with the description of six new species (Araneae: Mygalomorphae). *Zootaxa* 1915: 54–68. <https://doi.org/10.11646/zootaxa.1915.1.3>
- Raven R.J. 1985. The spider infraorder Mygalomorphae (Araneae): Cladistics and systematics. *Bulletin of the American Museum of Natural History* 182: 1–180. Available from <http://hdl.handle.net/2246/955> [accessed 5 Mar. 2024].
- Schmidt G. 2003. *Die Vogelspinnen: Eine weltweite Übersicht*. Neue Brehm-Bücherei Hohenwarsleben.
- Simon E. 1903. *Histoire naturelle des Araignées, Vol. 2*. Roret, Paris. <https://doi.org/10.5962/bhl.title.51973>
- Sherwood D. & Gabriel R. 2019. The first records of *Holothele longipes* (L. Koch, 1875) from Guyana and Panama (Araneae: Theraphosidae). *Arachnology* 18 (3): 280–283. <https://doi.org/10.13156/arac.2019.18.3.280>
- Sherwood D. & Gabriel R. 2022. A new species and two new genera of theraphosine from Peru (Araneae: Theraphosidae). *Arachnology* 19 (Special Issue): 247–256. <https://doi.org/10.13156/arac.2022.19.sp1.247>
- Turner S.P., Longhorn S.J., Hamilton C.A., Gabriel R., Pérez-Miles F. & Vogler A.P. 2018. Re-evaluating conservation priorities of New World tarantulas (Araneae: Theraphosidae) in a molecular framework indicates nonmonophyly of the genera, *Aphonopelma* and *Brachypelma*. *Systematics and Biodiversity* 16 (1): 89–107. <https://doi.org/10.1080/14772000.2017.1346719>

World Spider Catalog 2023. *World Spider Catalog. Version 24*. Natural History Museum Bern. Available from <http://wsc.nmbe.ch> [accessed 28 Jun. 2023]. <https://doi.org/10.24436/2>

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